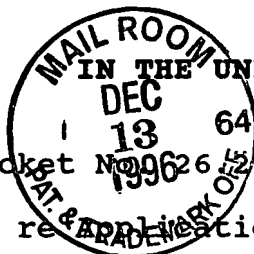


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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Docket No. 08/677,296/B/USA

In re Application of:

Steve A. Sallstrom et al.

Serial No. 08/677,296

Filed July 9, 1996

For ALL WHEEL HYDRAULIC
DRIVE SYSTEM

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) Group Art Unit 3501
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) Examiner
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INFORMATION DISCLOSURE STATEMENT

The Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

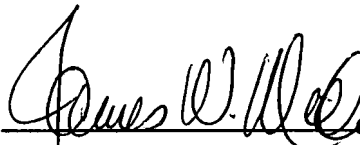
Pursuant to 37 C.F.R. §§ 1.56, 1.97 and 1.98, the Applicants wish to bring the prior art references listed on the two attached Forms PTO-1449 to the attention of the Patent and Trademark Office.

This citation is to make of record in this application the prior art that Applicants cited in the parent application, Serial No. 08/192,022, now U.S. Patent 5,533,325. Because this application is a divisional application of the parent, and not a continuation or continuation-in-part, it is not certain that the art previously cited by the Applicants would be available to the Examiner in this divisional application. Accordingly, this art is being recited herewith.

Rather than resummarize the prior art, copies of the prior IDS's filed in the parent application are being provided herewith, which prior IDS's contain an art summary. Accordingly, enclosed herewith is the Information Disclosure Statement dated May 4, 1994, and the Supplemental Information Disclosure Statement dated October 5, 1995, from the parent application, with attached copies of the prior art references. Two new Forms PTO-1449 are enclosed herewith having the case heading for this application so that the Examiner can properly check the references to indicate consideration of this art in this application.

The summaries of the references provided in the prior IDS's being filed herewith are for the Examiner's convenience only. The Examiner should also thoroughly review each reference to independently determine its relevance. It is believed that the claims of this application are allowable over the cited prior art.

Respectfully submitted,



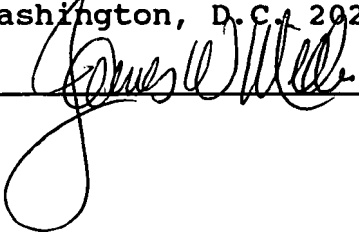
December 9, 1996

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or accompanying this document are being deposited with the U.S. Postal Service, as First Class Mail, in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231 on December 9, 1996.



U.S. Patent 3,712,404 to Walquist discloses a three wheel tractor having two front wheels 12 and a single, steerable rear wheel 11. Note the hydraulic fluid supply system shown in Fig. 16 which discloses separate hydraulic motors 159, 160 and 163 for driving the wheels with such motors being connected all in parallel to the hydraulic fluid source. See also Col. 10 of Walquist, Lines 26-34.

U.S. Patent 4,157,125 to Bushell discloses a three wheel vehicle having two front wheels 13 and 14 and a single, steerable rear wheel 15. Note the hydraulic fluid supply system shown in Fig. 3 which discloses separate hydraulic motors 13', 14' and 15' for driving the wheels. Hydraulic flow to the rear wheel motor 15' is separate from the parallel circuit supplying flow to the front wheel motors 13' and 14'. In some turns, a valve 21 bridges the separate circuit to the rear wheel motor 15' to then effectively create a parallel connection to all three wheel motors.

U.S. Patent 4,369,855 to Buschbom discloses a three wheel vehicle having two front wheels 12 and 13 and a single, steerable rear wheel 14. Note the hydraulic fluid supply system shown in Fig. 5. Separate hydraulic motors 26 and 27 for driving the front wheels 12 are connected in parallel to a first pump 57. A separate hydraulic motor 73 for the rear wheel 14 receives fluid from a separate second pump 58. A control device 83 automatically attempts to balance the pressure to the rear wheel supplied by the second pump so that all the wheels are driven at the same torque and speed. If one or more of the front wheels starts to slip, this would normally reduce the flow to the rear wheel as well. Thus, the operator can manually override

this control function to allow the second pump 58 to supply hydraulic fluid to the rear wheel motor 73 in a greater amount than would otherwise be permitted by control device 83. See Col. 5, Line 66 - Col. 6, Line 10 of Buschbom.

U.S. Patent 4,606,428 to Giere discloses a hydrostatic transaxle assembly for using hydraulic fluid from a pump to drive left and right axle shafts 21 and 23 with a differential action.

U.S. Patent 4,986,387 to Thompson et al. discloses a three wheel forklift truck having two front wheels 21 and 22 and a single, steerable rear wheel 23. Note the hydraulic fluid supply system shown in Fig. 5 which discloses separate hydraulic motors 31, 32 and 33 for driving the wheels. The motors are connected in parallel to the hydraulic fluid source 25. Drive to the rear wheel motor 33 is selectively disengageable through valve 30a to convert to two wheel drive.

U.S. Patent 5,199,525 to Schueler discloses a three wheel vehicle having two front wheels 14 and a single, steerable rear wheel 18. Separate hydraulic motors 12 drive the front wheels 14 and a separate hydraulic motor 16 drives the rear wheel 18. The motors are connected in parallel to the hydraulic fluid source 24. See, for example, Fig. 2A. However, if a wheel loses traction, this is sensed by a sensor and flow to the motor for that wheel is smoothly shut off. Fig. 2A shows flow to the rear wheel motor 16 having been disconnected by control circuit 16.

Toro Greensmaster 3100 Brochure discloses a greens mower manufactured and sold by The Toro Company prior to

this invention. This product is described more fully in the Background of the Invention section of this patent application. Note the "Traction Drive" box shown in the specification list for the Greensmaster 3100 Prime Mover describing use of "front wheel orbit motors" for driving the two front wheels of this product.

Toro Reelmaster 216 Brochure discloses a conventional riding mower manufactured and sold by The Toro Company prior to this invention. This product is described more fully in the Background of the Invention section of this patent application. Note the "Traction Drive" box shown in the Reelmaster 216 Specification list describing the two wheel and three wheel drives offered for this product. In the three wheel drive version, each wheel is operated by its own separate wheel motor with all three wheel motors being connected in parallel to the hydraulic fluid source.

Toro Reelmaster 3500-D Brochure discloses a conventional riding mower sold by The Toro Company prior to this invention. This product includes four wheels, two front wheels and two rear wheels, all of which are driven in this four wheel drive product. A front wheel motor drives the two front wheels through a hydrostatic transaxle providing a differential action between the front wheels, and a rear wheel motor drives the two rear wheels through a hydrostatic transaxle providing a differential action between the two rear wheels. THE FRONT AND REAR WHEEL MOTORS ARE CONNECTED TOGETHER IN SERIES RELATIVE TO THE HYDRAULIC PUMP. In addition, the output shaft of the rear wheel motor is connected by an overrunning clutch to the input shaft of the rear wheel transaxle to allow the rear wheels to overrun when necessary the rotational output of

the rear wheel motor. Note the "4 Wheel Drive System" box shown in the Reelmaster 3500-D, 4-WD Specification list describing this drive system.

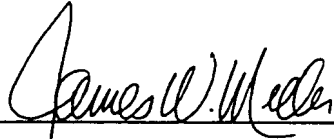
The publication dates for the above-noted Toro brochures may not be early enough to establish that these particular brochures are prior art to this invention. However, the brochures are not being submitted as prior art printed publications, but to simply illustrate various products that Applicants admit are prior art to this invention. In view of this admission, the products shown in these brochures should be fully considered by the Examiner, and such consideration should be noted by appropriately checking these brochures on the attached Form PTO-1449.

Enclosed herewith are copies of all of the references cited on the attached Form PTO-1449.

The summaries of the references provided herein are for the Examiner's convenience only. The Examiner should also thoroughly review each reference to independently determine its relevance. It is believed that the claims of this application are allowable over the cited prior art.

Respectfully submitted,

May 4, 1994



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James W. Miller

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In re Application of:

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GROUP 3500

) Group Art Unit 3501

) Examiner T. Melius

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driven by a pair of front wheel drive motors 11 and a pair of rear wheels driven by a pair of rear wheel drive motors 12. The pair of front wheel drive motors 11 are connected to one another in parallel. The pair of rear wheel drive motors 12 are also connected to one another in parallel. The pair of rear wheel drive motors 12 are connected in series to the pair of front wheel drive motors 11 by the valves 5 and 6.

The primary thrust of this patent appears to be directed to a system for automatically shutting off the drive to the rear wheel drive motors 12 when the steering wheel is turned by more than a certain amount. Thus, the vehicle is automatically converted from four wheel drive to two wheel drive without operator intervention in accordance with whether or not the vehicle is being turned by more than a predetermined amount. Fig. 1 illustrates the hydraulic fluid supply system in its four wheel drive mode. Fig. 2 illustrates the hydraulic fluid supply system in its two wheel drive mode.

An English language translation of the text of this patent, and an English language Dialog record including a translation of the abstract of the patent, is attached to the copy of the French patent.

German Patent 1,555,065 to Clark Equipment discloses a hydraulically driven vehicle having individual wheel drive motors on each drive wheel of the vehicle. Fig. 5 discloses a two wheel drive configuration and Fig. 1 discloses a four wheel drive configuration. Regardless of which configuration is at issue, the wheel drive motors are all serially connected to one another and to the pump 62 or 62' such that the entire fluid flow of the pump passes through each motor. To provide a differential action without having

to use valving of some type, this patent discloses pivoting the wheel drive motors during cornering as the steering wheel is turned.

An English language Dialog record including a translation of the abstract of the patent is attached to the copy of the German patent.

British Patent 791,903 to Rover discloses a hydraulically driven vehicle having individual wheel drive motors e on the front wheels of the vehicle with the rear wheels being driven through a variable speed gear box c and what appears to be a differential. In Fig. 1, the front wheel drive motors e are serially connected to each other and to the pump. In Fig. 2, the front wheel drive motors e are connected in parallel to the pump.

In the Fig. 1 embodiment comprising the serially connected drive motors e, a differential action is provided by the pipe i and valve j. See Page 1 of the British patent, Lines 40-45.

European Patent 324,970 to Deere discloses a lawn mower having a tricycle configuration with two front wheels 14 and 16 and a rear wheel 18. The lawn mower includes a rear mounted engine over the rear wheel 18. Three cutting units are carried on the mower in a staggered configuration. Two of the cutting units are in front of the front wheels 14 and 16 and one cutting unit is mounted generally in advance of the rear wheel 18. The drive system for the front and rear wheels 14, 16 and 18 does not appear to be specifically set forth or of interest in this patent.

An English language Dialog record including a translation of the abstract of the patent is attached to the copy of the European patent.

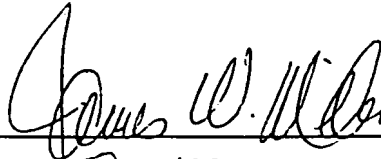
U.S. Patent 4,180,138 to Shea shows an internal combustion engine 20 driving the front wheels 27 of an automotive type vehicle through a differential 24. The rear wheels 37 are powered in a supplementary fashion by a separate auxiliary motor 40 which may be a hydraulic pump/motor (See the Abstract). A mechanical overrunning clutch couples each end of the rear axle shaft to one of the rear drive wheels. See Fig. 3 of Shea and Col. 4 of Shea, Lines 10-33. This avoids the necessity of "differential gearing". See Col. 4 of Shea, Lines 55-58. The auxiliary motor 40 is manually put into operation by the operator and is automatically disengaged when the motor 40 reaches a certain speed.

U.S. Patents 4,199,923 to Blake, 4,864,805 to Hager et al., and 5,042,236 to Lamusga et al. are all directed to mowers of various types having cutting units that engage the ground. These patents do not appear to teach with any detail which wheels in these vehicles are driven or specifically how such wheels are driven.

Enclosed herewith are copies of all of the references discussed herein and cited on the attached Form PTO-1449.

The summaries of the references provided herein are for the Examiner's convenience only. The Examiner should also thoroughly review each reference to independently determine its relevance. It is believed that the claims of the present application are allowable over the cited prior art.

Respectfully submitted,



October 5, 1995

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CERTIFICATION UNDER 37 CFR 1.97(e)

I hereby certify that each item of information in this SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT was cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT.



October 5, 1995

James W. Miller

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